

Zanzibar

Sir William Simpson

C. F. Linsley

REPORT OF THE PUBLIC HEALTH DEPARTMENT'S
WORK FOR THE YEAR 1909.[Enclosure in Mr. Clarke's No. 154 of
June 7, 1910.]

Observations of H.M. Agent
& Consul General.

Dr. A. H. Spurrier to Captain Barton.

Sir,

I HAVE the honour to present a Report of the Public Health Department's work for the year 1909, together with certain considerations on the public health of the town of Zanzibar, and of the islands generally.

Deaths.

The deaths in the town and suburban districts numbered—

1,154 in	..	..	1909
against { 1,249 in	..	..	1908
1,204 in	..	..	1907

giving for the past year a mortality of 15·4 per 1,000 if calculated on a town and suburban population of 75,000. This estimate of the total population is adhered to for comparative purposes, it being that adopted for the past five years. A recent attempt to make a census shows the population of this area to be only 40,000. This would make the death rate abnormally high, and there seems nothing to indicate that. The death rate of Calcutta, a very unhealthy city, is usually 31·6 per 1,000.

The deaths here, too, are run up by the many thousands of incomers from the north and Somali coasts in the north-east monsoon, many of whom arrive in a state of poverty, and with advanced chest diseases, aggravated by the long exposure of the journey, and when here have no homes, but lie on the beach exposed to all weathers, and are often found dead.

There is no doubt, on the other hand, that the crowded bazaars of Zanzibar town in the daytime give a fallacious idea of the population, as many thousands of people come into town daily from the shambas, and leave again before night. Many people are taken to the shambas when ill



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for treatment by native medicine men, and in consequence die there, and so again results are vitiated. The population of Zanzibar is probably one of these things which will never be known accurately. The deaths show a preponderance of deaths amongst males, the figures being—

Males	..	..	..	599
Females	..	..	..	555

The localities were—in the—

Town proper	..	..	..	511
Ngambo native quarter	..	..	..	542
Shambas near	..	..	..	83
Harbour	..	..	..	7
Unknown origin	..	..	..	10
Prison Island	..	..	..	1

Nationalities—Swahilis—

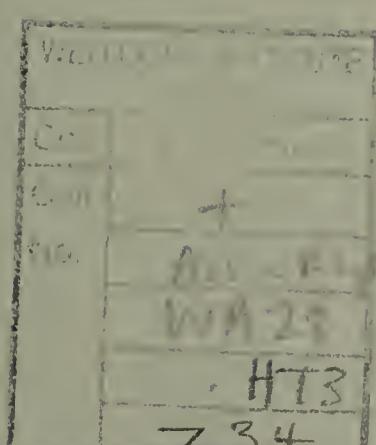
592 for	..	..	1909
against { 719 for	..	..	1908
709 for	..	..	1907

a satisfactory decrease.

The complete list is as follows:—

Nationality of the Deceased. Deaths:

Swahilis	..	..	..	592
Khoja Esmailis and Itnasheris	..	..	..	109
Arabs	..	..	..	83
Indian Mahomedan and Memans	..	..	..	82
Banyans (Hindoos)	..	..	..	78
Comoro Mgazijas	..	..	..	68
Washihiris	..	..	..	56
Bohoras	..	..	..	20
Somalis	..	..	..	12
Nyassas	..	..	..	11
Baluchis	..	..	..	11
Parsees	..	..	..	5
Yaos	..	..	..	5
Persians	..	..	..	3
Goans	..	..	..	2
Bawemba	..	..	..	2
Swahilis	..	..	..	2
Italian	..	..	..	1
Greek	..	..	..	1
Turk	..	..	..	1
Mtonga	..	..	..	1
Chinese	..	..	..	1
Alipejem	..	..	..	1
Moro	..	..	..	1
Wamba	..	..	..	1
Nyasa	..	..	..	1
Seychelles	..	..	..	1
Abyssinian	..	..	..	1
European	..	..	..	1
Barawa Italian	..	..	..	1
Total	..	..	..	1,154



The ages were—

		Deaths.
Under 1 year	..	99
1 to 5 years	..	53
5 „ 10 „	..	28
10 „ 20 „	..	90
20 „ 30 „	..	223
30 „ 40 „	..	174
40 „ 50 „	..	147
50 „ 60 „	..	136
60 „ 70 „	..	88
70 „ 80 „	..	72
80 „ 90 „	..	37
90 „ 100 „ and above	..	2
Unknown	..	5
Total	..	1,154

This shows a lamentable loss of infant and child life, decreasing from the children of a year old to the age of 10; after which, the mortality rises again to adolescence. A very high mortality is reached between the ages of 20 and 30. From the age of 30 it steadily declines until the natural close of life.

In the absence of a full and accurate census, it is uncertain whether this latter mortality is absolute or relative as the number of people of different ages has not been ascertained.

The causes of these high mortalities at certain ages is to be found in the list of causes of deaths.

The principal only are here given :—

Cause of Deaths.	Males.	Females.	Total.
Tuberculosis ..	80	103	183
Malarial fever ..	60	64	124
Diarrhoea ..	39	58	97
Dysentery ..	20	15	35
Debility and decay ..	77	91	168
Bronchitis ..	42	29	71
Rheumatism ..	26	43	69
Insanity ..	14	24	38
Syphilis ..	7	2	9
Pneumonia ..	19	9	28
Asthma ..	13	9	22
Paralysis ..	10	8	18
Beri-beri ..	3	2	5

The above account for four-fifths of the deaths.

Insanity, syphilis, paralysis, may be accounted as variations of syphilis—probably some of the deaths from paralysis should be debited to beri-beri. The leading disease which cuts off the people in early adult life is—

Tuberculosis :—

183	people	died	of	this	disease	in	1909
198	"	"	"	"	"	"	1908
176	"	"	"	"	"	"	1907

showing apparent actual decrease, but really a higher relative mortality, as the total deaths were fewer in 1909. It is probable, too, that many of the deaths ascribed to chronic diarrhoea and asthma were really due to tuberculosis.

The figures show that every other day someone dies of tuberculosis in Zanzibar town.

Malarial fever comes next in the cause of deaths :—

The deaths from malarial fever were 124 in 1909

against { 192 in 1908
 231 in 1907

Here there is a very satisfactory decrease, and the death rate from malaria is as surely falling as that from tuberculosis is rising.

Of the 124 deaths from malaria, 42 were of Swahilis, nearly one-third.

Of the 183 deaths from tuberculosis, 98 were of Swahilis, more than half.

Of the 97 deaths from diarrhoea, 68 were of Swahilis, more than two-thirds.

Of the 35 deaths from dysentery, 20 were of Swahilis, more than half.

Showing that tuberculosis is working havoc amongst the Swahilis.

The infantile and child deaths in the three past years were :—

270	in	..	..	..	1909
231	in	..	..	..	1908
220	in	..	..	..	1907

showing a steady rise of infant and child deaths.

The variations in the healthiness of the different districts month by month is shown in the death maps attached—the death being marked by black spots.

It would appear from these that the healthiest districts are Shangani, Baghani, Kidutani, contiguous.

It would appear from these that the unhealthiest districts are Kokoni, Darajani, Membe Tango, Mkunazini.

Practically all the Swahilis die without having ever been seen while alive by a qualified medical man. If they could be induced to come under rational and effective treatment for such maladies as malaria, dysentery, and allied diarrhoeas, a

Page 6.—I asked Dr. Spurrier if he had any suggestions to offer as to how best the infant mortality, to which he alludes, could be checked, but I regret to say that he had none.

large proportion of lives could be saved. There are indications that the natives brought into contact with Europeans they trust are beginning to realise the value of quinine in fever. Even very severe cases of diarrhoea and dysentery which have come in good time, under competent treatment have yielded quite easily. So that the greater part of the deaths due to these diseases may be regretted as lives thrown away.

The tuberculosis cases might also be much ameliorated and life prolonged, even if the disease is not stopped, by suitable treatment; but for this a special home is necessary. The present serious position indicates the need of some extra measures to stay the progress of the disease. Tuberculosis must certainly be made a notifiable disease here, and precautionary and disinfecting measures adopted. Otherwise the day will come when in the capital of the Swahilis there will be no Swahilis left.

Births.

Registration of births only came in force on the 1st July, 1909.

Births from the 1st July to the 31st December, 1909 :—

(a.) Number of births registered	248
(b.) Number of births amongst—	Births.
Males	134
Females	112
Still-born	2
	—
	248

Not included in the mortality :—

(c.) Nationality of the births—

Khoja Esmailis and Itnasheris ..	85
Banyans	40
Mahomedans and Memans	28
Bohoras	19
Swahilis	16
Arabs	16
Parsees	10
Awembas	7
Goans	6
Mangangas	6
Yaos	6
Persians	3
Seychelles Christian	1
Greek	1
Nyassa	1
European	1
Washira	1
Comoro Mgazija	1
	—
	248

Page 9.—It is much to be regretted that both the town and country population should be so very averse from registering the births of their children. It may be hoped, however, that in time they will cease to be so.

Improvement is very slow in receiving registration of births, the Government being suspected of some ulterior motive in its endeavour to find out when a birth has occurred. Constant enquiries are made as to whether there is not danger (*hatari*) in registering a birth. Witchcraft is feared, and all the Old Testament prejudice against numbering the people is brought to bear on the matter.

In Calcutta it has been found necessary to pay money for information to midwives, barbers, known gossips, and *pariawalas*.

Here the engaging of a town crier to cry the obligation of registration only brought ridicule on his head and no increase in births recorded. It was thought not unlikely that the police on beat in the native quarter would get to hear of births, but such is said not to be the case. In the country villages the *Masheha* is likely to know, and probably always does know.

It is even more difficult to get still-births registered; these often indicate the presence of syphilis and the outset of some zymotic disease, and so are very important. Once the Zanzibar baby is born its troubles begin. Midwives tampering with the mother derange the mother's milk supply. This gives the opportunity for the introduction into the child's mouth of everything the baby should not have, from adult's food to opium, and when, as in a tropical place as Zanzibar, cow's milk in all stages of decomposition and condensed milk kept open for days together is given to a baby, convulsions and bowel complaints form the purgatory the infant has to pass through before reaching the comparative heaven of a native child's life. Bounties and prizes at baby-shows are given both at Poona and Rangoon to coax the mothers to persevere in keeping the child alive until its first year is passed, and something of the kind seems needed here. Where parental management is feckless, the wise State should take charge and really mother the child.

The State is now standing by and longing to vaccinate the child. To attain this end in Calcutta it has been decided to combine the office of Sub-Registrar of Births with that of vaccinator. This could very well be done here when we get our vaccinators.

Before dealing with the question of a pure milk supply, which follows on from the care and

Page 10.—We shall endeavour to arrange for a baby show in connection with the second *sikukuu*, which will fall some time after Dr. Spurrier's return from leave. One was held some time ago by the King's African Rifles here, which was certainly amusing enough whatever its effect on the upbringing of the exhibits.

Page 10.—I am now considering some proposals in connection with the improvement of our system of vaccination here which will probably result in the combination of the offices of sub-registrar and vaccinator.

proper feeding of infants and children, a return must be made to the prevalent causes of death and remedies indicated. These can be best summarised :—

Tuberculosis.

Cause.—Dark, damp houses ; the spitting habit ; overcrowding ; milk from tuberculous cows ; abolition of the flat roof in the Indian and Arab houses in the narrow bazaars.

Remedy.—Improved flooring to native houses, allowing of their being scrubbed out without leaving them damp ; the provision of a “damp course” ; increased attention paid to the milk cows in the dairies—the tuberculin test used. (It has now been proved that mere inspection does not suffice to detect infection. Moreover, direct results from examination of milk are slow to procure) ; discouragement of the spitting habit ; efforts on the part of the Government to make the building of flat roofs again easy and lasting. Formerly all bedding and wearing apparel could be removed to the roof for airing and sunning, and at night, in fine and hot weather, people slept on the roofs and enjoyed open-air treatment.

Malarial Fever.

Cause.—Except within and near the town limits the factors at work are undrained land, open water, and with it anopheles mosquitoes ; neglect to take quinine or to use protective measures against mosquitoes ; neglect to deal with high temperatures ; by the absence of means of getting the temperature down ; and by people lying in the sun.

Remedy.—More teaching on this subject in the schools, amongst the head men of the villages, and the upper classes ; provision for quinine being at hand or obtainable at little cost ; the carrying out of rough pipe or rubble draining ; the cessation of making deep ditches alongside the roads, whereby long lagoons of water are left breeding mosquitoes and spreading malaria from village to village (unless the water can be carried away completely the roads are only made worse where the water hangs, by capillary attraction drawing the water up, and keeping the sub-construction of the road always moist) ; clearing under-

Page 7.—I have arranged with Dr. Spurrier that he is to make proposals in regard to declaring tuberculosis a notifiable disease at the same time that he places before us the proposed “Dairies” decree, on which he has been engaged for some time. This will probably be towards the end of the year.

Page 11.—Dr. Spurrier is to draw up a leaflet on this subject for distribution among the native population on his return.

growth, and thus pushing back the harbour for mosquitoes near the villages. It is safe to say now that a great proportion of the malarial fever cases are to be ascribed to infection acquired in the country.

Dysentery and Diarrhoeas. Tumbo Diseases.

Cause.—Drinking bad water from old wells and from holes in the ground, dug out often close by where an Indian is spreading manure on the ground for cultivation purposes; flies covering articles of food, dates, meat, sweetmeats, dried fish, and bread and sugar.

Remedy.—More pure water for all; closing the wells and putting up public standpipes; stopping the digging of water holes in unfit places; wire-gauzing the markets if possible; and taking more measures to catch and keep down the plague of flies. All the refuse in the town and Ngambo to be taken to the refuse destructor when ready.

Pure milk, pure food, and pure water should cut down a good deal of this yearly mortality.

Pure Milk Supply.

One hundred and ninety-seven visits of inspection have been paid to the dairies during the year, and eight notices have been served for increased light and ventilation. No radical improvement can take place in the dairies until a Dairies Decree is issued, and has been at work some time. The sites are bad, the buildings are bad, the management is unskilled, the cows themselves sometimes are not above suspicion, the milkman is a repulsive object, the method of cleansing vessels is unpleasant.

The dairies should be in the suburbs—it having been proved first that cows will live there. If not healthy for cows, something noxious at night is indicated. The present custom is to drive the cows out to graze every morning and to drive them back to town in the afternoon. For such cows as can be extricated from the tangle of the bazaars in this manner daily a milking-shed might be established outside the town, where the milking could be under supervision, and, at any rate, some pure milk be secured for use in the town.

The cows either outside or inside the town

should live by themselves, and not be kept under dwelling-houses, and sometimes even in back rooms, as is now frequently the case, especially when a single cow is kept for private purposes. The milk utensils must be properly cleaned, and for this a pure water supply must be laid on to each dairy. The milkman should be clean in garb and cleaner in habits. The milk should be protected from contamination and kept up to a certain standard.

Pure Food and Good Cheap Meat.

The regular inspection by the Government Veterinary of cattle to be slaughtered, and inspection of the meat after slaughtering, should provide against tuberculous meat being supplied to the public. From the point of view of improving the health of the people, it is very desirable that good meat should be a good deal cheaper. The native dietary is overladen with starchy matter, prone to dispose the native to fermentative stomach troubles, upon which is grafted a fatal diarrhoea and dysentery. At the present prices, to give him good meat which has not been lying about exposed to flies and coated with dust would be out of the question. For fly-proofing and dust-laying cost money, especially the former, but they will have to be done. Good brass or bronze metal wire screening, although costing a good deal at the outset, is very lasting. In India a new dust-laying preparation, called "Dusmo," is used with success around and within buildings which it is desirable to keep free from dust.

Tuberculous infection is acquirable from food so long as food is kept in shops which are used also as sleeping places. To remedy this is more difficult.

Supervision has been exercised over the bakehouses, and must be continued. Not only the flour, but the process of making bread needs watching. The following premises connected with the sale of food have been regularly inspected during the year:—

Bakehouses ..	..	..	..	9
Fruit stalls ..	..	..	..	35
Grocery shops ..	..	..	..	139
Rice godowns ..	..	..	..	42
Markets ..	..	..	..	5
Drug shops ..	..	..	..	27

The undernamed food has been condemned and destroyed:—

				Bags.
Rice	..	..	..	60
Potatoes	..	..	..	23
Dhal	..	..	..	2
Onions	..	..	..	42

The fish supply cannot be said to be as good and cheap as is needed in a town of this size, and, owing to the dearness of fresh fish, the people are thrown back on buying old and unwholesome so-called dried fish.

The whole dietary of the natives in the town calls for much improvement and change. It is not the natural dietary of the African and it is nothing like so varied as that of people living in the country districts. There is room for the introduction of maize from the cob to the flour; from the flour of maize all sorts of things can be made. There is far too much rice eaten, and of the uncured Rangoon variety, which is now proved to produce mal-nutrition and is the direct cause of beriberi.

But on every occasion where I have had occasion to speak to natives about food, complaints are at once made of the general high prices of food in the town. These complaints recur whenever salaries are discussed and rises applied for, and although arising but indirectly from the Public Health point of view if high prices are keeping the native to a limited and unsuitable diet I would ask that certain points be determined by those competent to pronounce on the matter. I beg to submit the following questions. Similar points are being investigated as regards food in India.

Food Prices.

1. I CANNOT say what the actual rise is. The rise in the price of food-stuffs began during the first invasion of the plague on all commodities, especially in the prices of grain foods.

2. I do not think so.

3. The rise in the price of grain foods has been due to famine, plague, and constant bad crops in India. The increase of customs duty from 5 to $7\frac{1}{2}$ per cent. has given the merchants a plea for raising prices something like 10 to 15 per cent.

4. I see no hope of prices falling, except the prices of grain foods imported from India.

5. I see no remedy. There are thousands of natives in town without work; why do not they go into the plantations and earn an honest living?

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found and life be eased (so that a native can keep himself, his wife, and children in a house kept in proper repair, and dress himself and all decently). (I am inclined to believe them when they assured me at present they cannot.)

Pure Water.

Page 12.—No progress has actually been made with the improvement of our water supply, but valuable data on the subject have been accumulated by the Director of Public Works, and I have hopes that before long the matter may really be taken in hand. The improvement when carried out will enable us to close many of the existing wells and to put up more stand-pipes.

Though it is most important to bring about as soon as possible the closing of all the wells in town for drinking purposes it has not been possible to fill up more than two wells during the year and to clean out and properly cover another. So long as the cholera prevails in Bombay, and so long as the steady and large immigration of Indians continues there is the danger of some convalescent starting an outbreak of cholera in Zanzibar. There is, too, rapid increase in the hook-worm disease ankylostomiasis, causing tropical anaemia and much sickness here, conveyed not only by infected drinking water but by the larvæ penetrating the skin of the feet and thus infecting those standing around a well.

Until a further supply of pipe water is attainable no more wells can be closed for fear of fire arising in the bazaars.

The localities where the wells most need closing and where hydrants are required are shown in the special map prepared brought fully up to date.

Twenty-five wells have been cleaned and treated with permanganate of potash during the year.

Water for Flushing Drains.

Such drains as exist here, called "main drains," have been flushed every week during the year. More water will be welcomed for this purpose, as at present water has to be carried by hand buckets to various parts of the town to flush the drains in places where the present system does not reach.

When a further supply is available, provision must be made for taking the waste into these drains. It is an easy thing to lay on water to houses, but much more difficult to dispose of the waste where there are no drains. Ground-floor taps and plugs for fire-hose should meet the real needs, and be easy to keep in working order.

Housing.

782 visits of inspection have been paid to Indian lodging-houses ("Gurfas," "Chawls") during the year. With free immigration these lodging-houses are apt to be overcrowded after each Bombay ship's arrival until the new comers have found their particular resting-place.

Thirty-two Indian hotels and boarding-houses were also inspected, and four Indian schools.

On 293 occasions disinfection had to be carried out, *i.e.*, spraying and washing out with diluted disinfectants. Minor repairs are always wanted, such as stoppage of rat holes, broken floors, and ruinous bazaars. The smaller the repair the greater the delay in getting it done. It would greatly help the sanitation of the town, and be a convenience and saving to the people, if the Public Health Department possessed its own jobbing mason, who could do repairs at once, the cost being charged to the house-owner, with a small covering margin. There is enough work to keep a man constantly employed, and endless breeding-places of rats would be promptly stopped.

The smaller Indian houses in the bazaars are becoming increasingly unhealthy from the rapid abandonment of the flat roof, which, though perfectly water-tight when the work was done in the old manner, with good material and plenty of labour, now seems beyond the ability of the modern builder to build.

The loss to the Indians and to the public health is very great. By day all bedding and apparel, carpets, and matting were taken up to be aired and sunned on the flat roof, and the contents in town of the rooms below, when what corresponds here to "spring cleaning" took place. Now there is no overflow space for those not having a back-yard, and, with the streets so narrow, nothing can be got out of the houses or cleaned in the light of day.

The flat roof, from its capability of being screened around to secure "purdah" seclusion, is the proper roof for Eastern peoples. Moreover, there is no danger from fire. Nothing is more certain than that before very long there will be a very great and disastrous fire in the bazaars of Zanzibar, and a huge conflagration will run unchecked through the streets, where

Page 17.—Provision for a jobbing mason to be attached to the Public Health Department will be inserted in the estimates for next year.

the houses are crowned with top wooden rooms and galvanized iron roofs, smoothly lined with high-dried wood.

A new kind of roofing is needed for the native huts when built close together. Fires are doubly disastrous to the native. He loses by fire and by the attentions of those around when his things are flung out in hot haste from the burning hut.

But the roofing must not be galvanized iron. Both the Missions from long experience have come to the conclusion that nothing is more unhealthy for the native than an iron-roofed hut unless the roof is double-ridged. With the ordinary "makuti" roofing air passes in and out through every chink. Iron is unbearably hot by day unless lined, when it gives harbour to rats. At night it presents a large, cold surface, from which condensed vapour drops, and the native hastens to stop up every chink, to the utter shutting out of air.

A solution of the hut roofing has been found in Uganda, where asbestos and cement plaques or tiles are used. With these there is still ventilation provided. Further good points in native houses are that every time the roof is mended the sunlight goes in, and every time the walls are repaired new earth is used and the old thrown out. The only thing wanting is a dry floor and a "damp course."

The absence of windows is to be deplored, but they favour thieves, and so are always closed. Windows in the west are made to be open in the east; they are looked upon as meant to be closed.

House Conservancy.

402 house closets have been emptied and disinfected.

105 cesspools disinfected.

2 cesspools condemned and filled in, during the year.

A vacuum cesspool emptying apparatus would save much time and nuisance. Owing to the streets being so extremely narrow, any systematic attempt at working the bucket system would be very troublesome, costly, and an obtrusive nuisance.

How long the highly charged sand of the bill or point on which Zanzibar is built can endure filth being added to it is a debatable point. It is often surprising to find how little matter a

Page 18.—It is difficult to see what can be done in the matter. We have removed the duty on Mangalore tiles with a view to encourage their importation as against corrugated iron, and I consistently decline to allow any public building to be erected with this infamous covering.

Page 19.—Provision for a vacuum cesspool emptying apparatus has been made in next year's estimates, as also for the erection of two or three latrines in various parts of the town.

cesspool in long use contains. It would seem that the cesspools become septic pits wherein everything disintegrates and disperses.

One bad feature of the cesspool is the readiness with which mosquitoes breed out from it. Kerosine is regularly required to be thrown into the cesspool, a proceeding regarded with thrifty horror by the native.

Public Latrines.

A real and immediate need is the provision of public latrines in certain places. These need not necessarily be on the sea front where they would be unpleasantly prominent, but in such situations near that a short drain could be laid through the beach to the edge of the deep water. The latrines should be supplied with automatic flush apparatus. Until these latrines are built, there should be no rigid interference with the natives using the water's edges, as that is far preferable to the committal of nuisances in the narrow streets, whereby parasites of the worst kinds are disseminated, infecting the public passing.

Street Refuse.

48,948 loads of refuse have been removed from the town during the year, a monthly average of 4,079 loads, *i.e.*, from 800 tons to 900 tons. It is hoped this amount will be able to be consumed in the new refuse destructor to the very great improvement of the creek, along the banks of which, on the native town side, the refuse is now dumped. Though burnt over periodically in order to check the nuisance of flies breeding, the runnings from these vast banks of refuse pollute the creek, whilst the decomposing mass gives off unpleasant and noxious odours, especially noticeable at night.

Rats, too, are attracted there, and the health of the dwellers by cannot be improved; only those natives keeping poultry are tolerant of this nuisance close to their doors. Complaints from others are frequent; silenced by promises that the destructor, once going, will end it all.

Page 21.—I am considering in conjunction with the Director of Public Works what steps should be taken with a view to improving our present roads, which I am free to admit are disgraceful.

Streets and Roads.

The whole of the streets in the town have been swept twice daily on ordinary days and once on Sundays and public holidays.

The reason of this is that the streets are very narrow, and the trolleys, which are practically our only form of traffic, are thus obliged to follow one undeviating line, the consequence being that as they are heavily loaded, they soon completely break the back of the road. Moreover, the stone used is very soft, and the bandas or projecting roofs of the houses drop their water almost exactly on the line of the ruts which they thus tend to deepen.

The result of all this is that scarcely is a road mended than it becomes as bad as ever.

I have already taken steps to lighten as far as possible the loads carried by the trolleys by issuing orders that none loaded above a certain weight are to be permitted to enter or leave the Customs; while the police are doing their best to carry out the same policy in regard to those met abroad. With reference to the roads themselves we are making enquiries with a view to ascertaining whether it may not be possible to obtain better road-making material from the coast opposite. I am also having some experiments made in the manufacture of tar-macadam, and I have decided on mending one of our worst—and also one of our most important streets—after a new way, that is to say, concreting the line followed by the wheels. Mr. Galbraith has great hopes of this method—at any rate it is worth trying. Meanwhile we are doing our best to fill up the worst holes in a rough and ready way.

Page 21.—The question of how best to deal with storm water will be considered on Dr. Spurrier's return.

In the meantime we are gradually getting the Indians to provide their roofs with proper gutters; and as soon as we get an efficient plumber—he is one of the Public Works Department man we are endeavouring to obtain from India—I intend that he shall take two or three apprentices in the hope that thus gradually a good school of plumbing may be formed in the town.

The broken roads with their ruts and hollows make the working of the scavenging carts very difficult, and cause much extra labour in sweeping.

The roads leading out of town are swept to a mile out and along the girdle road looping the main roads. What is left of the swamps lying alongside these roads has received attention as described below in anti-malarial measures.

Storm Water.

As soon as is practicable some arrangements should be made for the taking away of the storm water at certain spots in the town when there is a great washing away of road surface.

The protection of the streets in the town against heavy downpours of rain remains a problem not easy to solve in the absence of good road material.

For the very narrow roads when there is no wheel traffic the best system is to slope the road from each side towards the middle, which should be paved with as good stone as can be got, or to pigalia the road, that is beat into the road surface lime sand and a binding earth.

Should the refuse destructor produce any clinker it will come in for this purpose.

Undoubtedly a lot of destruction is caused by the rush of water off the galvanized iron roofs imperfectly provided with gutterings.

Until the services of a competent plumber can be secured for Zanzibar there can be no permanent improvement in these gutterings. The work is charged for at an expensive rate, but tumbles to pieces in but a month or two's time.

This subject would appear to be more within the scope of the Public Works Department, but it directly affects the economy and efficiency of the scavenging of the town, the streets cannot be properly and quickly swept with all these holes and ruts in the roads. The gutterings put up without proper fall and with inadequate down-take pipes are quickly choked and breed mosquitoes. It is impossible to discover such breeding places except from the upstairs windows of the houses, a proceeding beset with difficulties when the house contains purdah women.

The sandy débris caused by the great wear of the roads often blocks the main drains, and this

may not be discovered until during the use of the Clayton gas on the drains the gas is found not to be passing freely.

When not in flood with rains the streets become in the dry weather very dusty, and watering them is beset with difficulties. To the complaints about mud succeed complaints about dust, for in this dust lurk germs, jiggirs, and fleas.

The dust is at times such a nuisance at places of crowded resort, such as the Courts, the markets front and the Darajani bridge, that some means of alaying it must be found.

"The Indian Public Health and Municipal Journal" recommends strongly a preparation named "Dusmo," which, being hygroscopic, can be used over again, and in this moisture laden air may prove of great value. I recommend making a trial of some at the spots named.

For street rubbish many capacious and covered dustbins have been placed about the town, and have helped to keep the streets cleaner between the times of passing of the dust-carts. It is hoped in time that the refuse from each house will be put out in covered refuse boxes for removal.

The co-operation of the police has been sought in this matter. The Commandant of Police has also issued as general orders that the police have to report at once leaking water-taps at the public hydrants, standing pools of water, blocked drains, obstructions in streets, encroachments on streets and open spaces, suspected leper cases. The police are ordered to prevent committal of nuisances, overloading of trucks and carts, deposit of refuse around the creek edges, burials without burial permits. They are also ordered to remove to hospital the homeless sick and the apparent insane, and the pauper dead to the mortuary.

Notifications.

Notices, with view to prosecution if not complied with, have been issued as under:—

For repairs of drain-pipes and cesspools ..	82
,, general repair of premises	9
,, whitewashing of interiors	12
,, mosquito nuisances	16
,, repairs of cowsheds; light and ventilation	8
,, overcrowding	3
,, wells to be filled in or properly covered ..	3
,, abatement of general nuisances.. ..	14
Total	145

Special circumstances and inveterate obstinacy have impelled prosecutions in three cases, resulting in convictions of the offending parties.

Noxious Industries.

~~Pages 24 and 25.~~—The question of what steps can be taken with a view to the removal of certain noxious industries from the near neighbourhood of the town will be considered on Dr. Spurrier's return.

Hides and skins still continue to be exposed for drying, and in small quantities for curing, within the town limits—an unpleasant, and at times possibly dangerous, process. The question of eventually removing this industry to a reasonably accessible place outside the town is very desirable. The curing is by far the more noxious process.

Potteries.—The potteries, too, might with advantage be removed to the suburbs, as the dung burning to "kiln" the pots is a nuisance and an untidy process.

Special Work.

Five cases of plague occurred in the months of July, October, and November; three of the cases being Banyans, one an Itnasher Khoja, and the last a Goan. With the exception of the last they may all be considered to have been in one connected block of premises. The origin could not be traced. None of the trapped rats caught in the premises showed signs of plague.

Inoculation with Haffkine's preventive was at once pressed on, and 3,451 people were inoculated as under:—

Inoculation.

Number of persons inoculated during the year with anti-plague serum—

Nationality—

Khojas Esmailis and Itnasharis	2,010
Banyans (Hindoos)	1,024
Bohoras	113
Swahilis	112
Goans	111
Ceylonese	43
Memans	12
Europeans	7
Parsees	4
Japanese	3
Arabs	2
Total	3,451

The destruction of rats by trapping and poisoning has been regularly pursued, with daily microscopic examination of slides from their internal organs. The system by which the source

of origin of each rat can be traced right back from the slide under the microscope is still carefully followed out, has been of proved value, and has been thoroughly approved by all three of the German experts who have at intervals inspected our work here.

Rats.

(a.) Number of rats received at the various collecting stations during the year 1909 :—

At the receiving office, V. Gardens ..	24,892
Mlandego station	13,104
Darajani station	7,011
Mwembe Ladu station	6,693
Sokomogo station	5,920
Malindi station	2,907
 Total rats	 69,527

(b.) Description of rats :—

Brown rats	31,300
Black rats	17,362
E. gray rats	3,740
Musk rats	3,090
Buku	31
White rats	2
Decomposed rats	2
 Total	 60,527

(c.) Number of pregnant rats with foetuses :—

Pregnant rats	2,868
Foetuses	18,346

(d.) Number of rats examined for plague 57,501

(e.) Result of microscopic examination .. Negative.

Anti-Malarial Work.

The following swamps and other places found breeding anophelles larvæ were regularly inspected and kerosened when required during the year :—

- The Ziwani swamp.
- The Sebuleni swamp.
- The Kiungani swamp.
- The further Kiungani swamp, by the side of Mr. Bhanji's shamba.
- The marshy ground owned by Essajee Jeewanjee at Kikwajuni.
- The Kikwajuni quarry ground, low ground at Mtendeni, on the way to the Indian soap factory.
- The hollow ditches at Mwembe Ladu.
- The swamp by the side of Lady Jenbai's Road.
- The low ground leading to the Gulioni Hospital, and other places where rain-water remained stagnant.

The following work had to be done by the Public Health Department to drain off the surface water following heavy rains:—

A ditch of about 1,400 feet long, with many cross drains, was constructed by the side of Lady Janbai's Road at Mwembe Ladu.

Two ditches of 1,020 feet and 748 feet in length were ditched out at Gulioni; 400 feet length surface drain was made at the Dhoby tanks, Gulioni.

In addition to the drainage of the Ziwani swamp by the Public Works Department, a ditch of 200 feet was constructed at the Ziwani outlet to the sea-beach by the Public Health Department.

A ditch of 390 feet long was made from the further end of the naval canteen ground to the sea-beach, and hollow places filled in.

On three occasions anopheles mosquito larvae were found in water lying in stone boats and dugouts drawn up on the beach.

At the beginning of the year a mosquito inspector was appointed for regular inspection of water in houses and lying on undrained ground about and around the town. The inspector has been most diligent, and has done most excellent work. It has been found, however, necessary to provide him with an assistant to carry a ladder, tin of kerosene, and bottles. He is now able to get through his work more quickly. The improvement in the town in the matter of mosquitoes is a matter of general comment.

Mosquito Inspection Work.

Number of premises, including ruins, graveyards, and other places visited during the months of:—

January	..	..	..	..	540
February	..	..	..	..	610
March	..	..	..	..	648
April	..	..	..	..	627
May	..	..	..	..	712
June	..	..	..	..	715
July	..	..	..	..	790
August	..	..	..	..	604
September	..	..	..	..	540
October	..	..	..	..	771
November	..	..	..	..	708
December	..	..	..	..	807
Total	..	..	..	..	<hr/>8,072

STATEMENT showing the number of Premises, &c., where Mosquito Breeding-places were found during the year ending 1909.

European quarters	170
Indian and other Asiatic quarters	229
Arab quarters	68
Swahilis and other African quarters	110
Ruins, grave-yards, cowsheds, stables, &c.	286
Total	863

Zymotic Diseases.

Measles in a mild form was very prevalent in the early part of the year. One case in the prison was removed to the Prison Island Sanitary Station.

Chicken-pox was also prevalent. Four cases amongst prisoners and three amongst askaris were removed to Prison Island.

There is a belief that an outburst of chicken-pox is often followed by small-pox. Vaccination has been pressed as much as was practicable with no decree to enforce it. Though beset with vexations and delays, the results are not so very disappointing.

Vaccination.

Number of persons vaccinated against small-pox during the year :—

Persons vaccinated	2,152
Swahilis	1,047
Indians	877
Arabs	121
Goans	40
Other nationalities	30
Ceylonese	24
Europeans	13
Total	2,152

For the treatment of cases of infectious disease unable to be isolated effectively in their own homes there is great need of an infectious hospital. Though for a long time to come it will be difficult to compel the higher class and more bigoted Indians to make use of Government hospital accommodation and treatment for either themselves or their families, it will be found that these same people are only too willing to allow their servants who fall sick to be taken off their premises. These servants, too, generally

~~Page 29.~~—It will, I hope, be possible to insert provision for a small infectious hospital in the estimates for next year.

sleep on the ground, and roam about the town in most questionable premises, and so are more often found falling victims to dangerous complaints than the rest of the members of the household who live in the safer upstairs quarters.

In order to bring Zanzibar into line with other places, it will be further necessary to have a home on hospital lines for the treatment of tuberculous patients. Many of these find their way to the Walezo Poor House. If the leper asylum and poor house buildings are abandoned for their present purposes, some use in this direction might be made of the buildings.

Beriberi.

The prisoners in the town gaol have been seriously affected with beriberi in the past year. Twenty-six cases were removed to Prison Island Sanitary Station, where three died, the rest making a good recovery.

The prison was disinfected throughout repeatedly, and brought into such a condition that, considering the old nature of the building, its state could not have been improved upon. Everything throughout was kept in a most sanitary condition, but nothing affected the incidence of cases until an absolute stoppage of the use of uncured rice was decided upon. Improvement set in from that time.

Such definite conclusions have been arrived at incriminating uncured rice, that it is proposed in certain States where beriberi is prone to occur to stop the importation of uncured rice, or to check it by putting a high duty on it. It is said that the cost of curing rice and rendering it free from beriberi producing properties, is very little more than that of the present system, which consists in merely milling the rice. Cured rice is rice which has been parboiled before milling. By this process the valuable layer immediately beneath the husk is left in the rice grain itself, and is not milled away with the husk. This layer contains a considerable amount of organically combined phosphorous, which is the regular nutrition of the nerves. If it is absent there is no maintenance or replenishing of the nervous system, and this nerve starvation is beriberi. The cured rice is known in Zanzibar as *tokosa*. It is somewhat dearer than the Rangoon rice, but

Page 30.—Dr. Spurrier informs me that he has spoken to Major Cartwright in regard to the desirability of varying the gaol dietary, and steps will be taken in this direction.

very much more nutritious, hence there is true economy in its use in the end.

It would be beneficial to reduce the consumption of rice in the gaol, and to vary the diet by the introduction of maize flour and changes of pulses.

Any outbreak of small-pox in the prison is prevented by newcomers being vaccinated on the first Sunday after admission, unless they have already been vaccinated successfully and recently, or have already had small-pox.

Leprosy.

There were ninety-one lepers in the Walezo Leper Asylum at the beginning of the year, and at the close the same number. Two died.

Returns have been made by the assistant collectors from the information supplied by the Masheha, which show that there are lepers isolated in the different villages, and distributed as follows:—

Mkokotoni district	..	..	..	23
Chwaka district	..	..	..	38
Mwera district	..	..	..	26

There are also 129 lepers in Pemba. This will give 216 more known lepers to become inmates of the new general leper asylum when built, making, with the ninety-one already in the present leper asylum, 307.

Cemeteries.

A list of burial-grounds in use in the town and suburbs has been compiled. A beginning has been made in putting up fencing around the graveyards.

A piece of ground just outside the native quarter of the town has been recommended as a site for general burying in the future for those who are not entitled to be buried in existing family or tribal burial-grounds. Ships have been given pratique during the year; 248 dhows from the Arabian and Indian coast ports and North were inspected on arrival.

In arranging the payment of the light dues it was promised that ships would be given pratique at once on arrival at any hour of the day or night. As this instant granting of pratique secures the payment of the dues and the work is

Proposals have now been made for settling these people a little to the north of the deserted palace of Chuini, some 9 or 10 miles by road from Zanzibar, and I hope shortly to be able to go over the ground myself with Dr. MacDonald.

The question however does not appear to me to be a very pressing one, as leprosy is not spreading in the island, and the lepers do not give much trouble where they are. Moreover, there are rumours in the air of the discovery of a remedy for the disease, which would render any segregation of its victims unnecessary.

done by the health officer, it would seem only fitting that a certain part of this revenue should be credited to the Public Health Department.

Quarantine.

No ship was placed in quarantine during the year. The Prison Island Sanitary Station was made full use of for the treatment of outbreaks of chicken-pox and beriberi amongst the police, prisoners, and King's African Rifles, and for cases under observation during the period in which the plague cases occurred in Zanzibar forty-three cases were taken there.

These cases were :—

Beriberi	..	..	..	27
Chicken-pox	..	..	..	11
Measles	..	..	..	2
Small-pox	..	..	..	1
Phthisis	..	..	..	1
Mumps	..	..	..	1
Total ..	..	..	..	43

New Offices and Laboratory.

The new block of offices and laboratory is nearing completion. It is hoped that, besides the routine work of examination of rats and of material from clinical cases in the hospitals, all cattle diseases and parasites and affections of the economic products of the island with the various analyses required will be able to be undertaken by Mr. Parham, the bacteriologist.

Public Health Decree.

The year has seen an attempt to levy a sanitary cess and the publication of the Public Health Decree, which has much facilitated the dealing with nuisances, but which will only gradually confer its full benefits.

The habits of Eastern peoples, which mostly seem bad from a Western point of view, are but slowly changed despite decrees.

Weather Report.

The total rainfall for the year was 85·14 inches, of which—

